GROUNDWATER USE AND CONSERVATION IN THE SAVANNAH AREA

Mary A. Elfner

AUTHOR: Water Conservation Planner, Chatham County-Savannah Metropolitan Planning Commission, 110 E. State St., Savannah, Georgia 31401.
REFERENCE: *Proceedings of the 1997 Georgia Water Resources Conference*, held March 20 and 21, 1997, at The University of Georgia, Kathryn J. Hatcher, Editor, Institute of Ecology, The University of Georgia, Athens, Georgia.

Abstract. The Floridan Aquifer supplies high quality groundwater to industrial, agricultural, commercial, and residential users throughout Florida, the coastal plain of Georgia, and southern portions of South Carolina and Alabama. How can we best utilize this resource without doing damage to its life-sustaining qualities? Water conservation can help us utilize the aquifer in a sustainable manner. This paper will attempt to answer these questions of sustainable use by looking at the big picture: who are the users, how much do they use, and what amount of withdrawal can the aquifer sustain? Also explored is how water conservation practices can help us to be better stewards of the aquifer.

INTRODUCTION

The Floridan Aquifer

Ground water is one of the Nation's greatest natural resources. Forty percent of this ground water is used for public supply and ninety-seven percent of the people who live in rural areas, and have no access to public water-supply systems, utilize ground water for drinking. The agricultural industry uses thirty to forty percent of our ground water for irrigation purposes. Ground water use is expected to rise in the future as population increases (USGS, 1995).

The Floridan Aquifer, located in the Coastal Plain of Georgia, Florida, and coastal areas of South Carolina and Alabama, is one of our Nation's great aquifers. The Floridan aquifer system is composed of carbonate rock, mostly limestone, and thickens from less than 100 feet at the northern end near Hilton Head Island, S.C., to more than 2,000 feet in Glynn and Camden Counties, Georgia, and Nassau County, Florida.

GROUNDWATER USE

History of Groundwater Use in Savannah

In 1733, General James Oglethorpe founded the City of Savannah on Yamacraw Bluff located 18 miles from the mouth of the Savannah River. The Indians and early European settlers utilized the Savannah River and a few freshwater springs as their source of water. It wasn't until 1885, when the first well was drilled by Captain D.G. First and Colonel J.H. Estell, that the community began using well water for its public supply (Chatham County-Savannah MPC, 1995). When artesian wells were first driven into the Floridan Aquifer in Savannah, the water rose 30 to 35 feet above mean low water, but with increasing groundwater usage, that level fell at least 20 to 25 feet within three years. By the turn of the century, pumps were needed to lift the water out of the ground. At first, these pumps were steam driven, but the city switched to electrically driven pumps in 1920. A surface water treatment plant was built in 1945 to supplement the city ground water system.

Today, Chatham County uses approximately 47 million gallons of surface water and 76 million gallons of ground water per day. The entire coastal area of Georgia uses approximately 370 million gallons per day for cities, industries, and farms.

Present Groundwater Use in Chatham County

In 1995, the Chatham County-Savannah Metropolitan Planning Commission produced the Comprehensive Water Supply Management Plan. This plan outlines water usage in our community: history, existing studies, current management practices, water usage, future water demands, and alternative management scenarios. Total water usage in Chatham County for 1992, shown in Table 1, is taken from this plan.

History of Concerns About Sustainable Use of the Aquifer

Sustainable use of the Floridan Aquifer is not a new issue. Articles have been written in the Savannah newspaper concerning groundwater issues since the 1930s. This section of the paper will attempt to summarize these articles.

Table 1. Total Ground Water Usage in Chatham County, 1992* (Average MGD Usage).

Total Ground Water Use	76.490 mgd
Residential/ Governmental	35.155 mgd
Institutional/Industrial	37.730 mgd**
Individual Wells	3.205 mgd
Irrigation	.400 mgd

*Includes all municipal systems, industrial ground water users, small community systems, other EPD permitted systems, individual homes on private wells and agricultural irrigation.

**This amount is decreasing due to implementation of conservation programs at manufacturing facilities.

An early newspaper article was found in the August 15, 1938, edition of the Savannah Morning News. In this article, Arthur J. Funk, a former physics professor at Savannah High School, pointed out that, due to dropping ground water levels, salt water might enter the aquifer if too much of the artesian supply was used. It was known then that there was flow of fresh water from the aquifer to the sea somewhere on the continental shelf: "The strata in which the water is located has an opening at sea through which the salt water might enter if too much of the artesian supply is used."

On September 16, 1947, a newspaper article was published in the Savannah Morning News entitled *Water Conservation Called Vital to City's Progress*. In this article, Thomas C. Earl, Superintendent of the Water Department, "...pointed out that the maximum allowable pumpage to safeguard against salt encroachment...has been fixed by the government at 25,000,000 gallons per day." At that time, aquifer usage was 36 million gallons per day (mgd) and increasing, and the surface water, or I&D, treatment plant was just being built to help reduce ground water usage. "It is now necessary, Mr. Earl said, for more large industrial consumers to purchase this treated river water to bring the plant up to capacity and to reduce underground pumpage."

During the 1950's there was much debate about whether allowing additional industrial wells to be drilled would harm the ground water supply. During that decade, industry was on the rebound, and expansion was occurring. American Cyanamide wanted to put in two wells to partly supply their HVAC system. Many local government officials were in support of the industries' needs. Much debate ensued, and a series of articles were printed in the Savannah Morning News on water resources conservation.

In 1969 letters were exchanged between Arthur J. Funk, who by now was a state government representative, and Albert N. Cameron of the U.S. Geological Survey. Mr. Funk requested of Mr. Cameron a realistic estimate of the average daily pumpage of ground water that would arrest and reverse sea water movement based on present well layout in the Savannah area. Mr. Cameron wrote back that the earlier estimate of 25 mgd could be increased to 40 mgd, but gives no supporting data as to how he came to this conclusion. And by this time, pumpage in the Savannah area was well over that limit at 65 mgd. Mr. Cameron also goes on to state that the citizens of Chatham County and the coastal area should determine what levels of ground water withdrawal are safe and desirable and insist that safeguards are maintained in any overall plan for the coastal area.

In 1971, a book was published which helped to bring about discussion and change. This book was *The Water Lords*, and it tells the story of changing the way of business as usual. Attention was brought to the community and the Nation concerning natural resource use and abuse, with emphasis on water quality in Savannah/Chatham County. This book was a catalyst for a new set of newspaper articles on the Floridan Aquifer, still being called the Ocala Aquifer at this time. More test wells were drilled to study the problem.

The issue resurfaced in the late 1980's when computer models were becoming popular. Computer models were being developed that would help make water management decisions. This trend continues to this day, but we still have yet to come up with sustainable use numbers for the Floridan Aquifer.

Water Conservation

Water conservation practices have the effect of increasing water-use efficiency. Efficient water use can result in benefits to water utilities and their customers. Some of the more common benefits are: reducing water demand during drought years, extending water supplies during other emergency situations, saving energy, reducing wastewater flow, protecting environmental values, and reducing water costs (Maddaus 1987). In Savannah, Georgia, we are most concerned with environmental protection due to the fact that saltwater intrusion is occurring in the coastal communities of Hilton Head, S.C., and Brunswick, Georgia.

In 1995 a water conservation planning position was created at the Chatham County-Savannah Metropolitan Planning Commission to address the need for water

conservation in the coastal area. In order to plan for water conservation, categories of water users must be defined. The following groups are typical water users: residential, commercial, industrial, governmental, and agricultural. Unaccounted-for water, which is the difference between water delivered into the system and metered water sales (this includes system leakage and unmetered water usage), can also be defined loosely as another "user" category.

The types of programs now being developed concerning water conservation are: public education programs, water conservation rate structures, water conservation baseline surveys, plumbing retrofit programs, and water efficiency planning.

CONCLUSIONS

Water conservation and sustainable use of the Floridan Aquifer are not new subjects. People in this state and community have been grappling with these subjects for decades. We may not be able to come up with sustainable use quantities for the Floridan Aquifer. Rather, we should set a limit based on past experience and knowledge to date. It is also time that we seriously utilize water conservation and efficiency programs to address the issues at hand concerning salt water intrusion of the Floridan Aquifer on a regional basis.

ACKNOWLEDGMENTS

I would like to thank the City of Savannah Water & Sewer Bureau, Chatham County, and the Chatham County-Savannah Metropolitan Planning Commission for their help with the Water Conservation Program.

LITERATURE CITED

Chatham County-Savannah Metropolitan Planning Commission. 1995. Comprehensive Water Supply Management Plan for Chatham County, Georgia. 174 pp.

Maddaus, William O. 1987. Water Conservation. American Water Works Association, Denver, Colorado. 2P-2M-20238-11/89-WP. 93 pp.

U.S. Geological Survey. 1995. Ground-Water Studies. Fact Sheet FS-058-95.